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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/699,287	10/31/2003	Tony Mule	62020-1290	2569
24504 7590 10/30/2008 THOMAS, KAYDEN, HORSTEMEYER & RISLEY, LLP 600 GALLERIA PARKWAY, S.E. STE 1500 ATLANTA, GA 30339-5994				
EXAMINER DANIELS, MATTHEW J				
ART UNIT		PAPER NUMBER		
1791				
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/699,287

Applicant(s)

MULE ET AL.

Examiner

MATTHEW J. DANIELS

Art Unit

1791

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 18 July 2008.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-21 is/are pending in the application.
- 4a) Of the above claim(s) 1-7 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 8-21 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SF/ICE)
Paper No(s)/Mail Date 1/23/04
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Election/Restrictions

1. Applicant's election of Species B (Claims 8-21) in the reply filed on 18 July 2008 is acknowledged. Because applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)).

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. **Claims 8-10, 12, and 13** are rejected under 35 U.S.C. 102(b) as anticipated by Choi (US 2002/0094496), **As to Claim 8**, Choi teaches method for nano-indentation, comprising:

providing a substrate having a polymer layer disposed on the substrate, the polymer layer includes a polymer material that is in an uncured plastic state ([0006]);

providing a stamp mask having a photomask ([0088]) and at least one nano-indentation structure (Fig. 1B, item 14) for forming a physical feature on the polymer layer, wherein the photomask does not cover at least one area of the polymer material (holes, [0088]); and

stamping the polymer material with the stamp mask (Fig. 1B), wherein the polymer material forms the physical feature caused by the at least one nano-indentation structure ([0006]).

As to Claims 9 and 10, Choi teaches that the curable material is exposed to light energy ([0006]; [0012]), which would be optical energy, in order to cure the photoresist ([0012]). **As to Claims 12 and 13**, in the Choi process, a polymer structure is formed having the physical feature in the form of a multi-tooth feature (Fig. 2D).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. **Claim 11** is rejected under 35 U.S.C. 103(a) as being unpatentable over Choi (US 2002/0094496) in view of Schneider (US 3,936,301). Choi teaches the subject matter of Claim 8 above under 35 USC 102(b). **As to Claim 11**, Choi teaches curing by application of UV light, but is silent to the removal of the polymer material not exposed to the optical energy. However, Schneider teaches to expose portions of a photoresist through a contact mask and to remove the portions not exposed to the optical energy (4:1-8). It would have been prima facie obvious to one of ordinary skill in the art at the time of the invention to incorporate the method of Schneider into that of Choi because Choi suggests use of a mask which contacts a photoresist and exposure of the resist, and Schneider provides a process specifically suggested for masks which contact a photoresist surface.

4. **Claims 14, 15, 17, 18, 20, and 21** are rejected under 35 U.S.C. 103(a) as being unpatentable over Choi (US 2002/0094496) in view of Canavello (US 4,379,833). **As to Claim 14**, Choi teaches a method of forming a structure, comprising:

providing a substrate and a polymer layer (Fig. 2B, items 18, 20, 40), the polymer layer is disposed on the substrate (Figs. 2A-2C), wherein the polymer layer includes a negative resist (Fig. 2C, 2D), wherein the polymer material is in an uncured plastic state (Fig. 2C, 2D).

providing a stamp mask having a photomask ([0088]) and at least one nano-indentation structure for forming a physical feature on the polymer layer (Fig. 2D, item 12), wherein the photomask does not cover at least one directly exposed portion of the polymer material (holes, [0088]);

stamping the polymer material with the stamp mask, wherein the polymer material forms the physical feature caused by the at least one nano-indentation structure (Fig. 2A-2D); and

exposing the at least one directly exposed portion of the polymer material to optical energy, wherein the optical energy passes through the at least one directly exposed portion of the polymer material (Fig. 2C, item 32).

Choi is silent to the at least one element on the surface selected from a refractive and diffractive element and using the refractive element to form an indirectly exposed region.

However, Canavello teaches that it is known to provide an element (22) selected from a refractive element (mirror) wherein the light from an exposure process is reflected off the element (26) forming an indirectly exposed portion of polymer material (26). It is submitted that the reflective elements of Canavello would also inherently scatter light in oblique directions, thus providing additional exposed portions outside the mirror elements.

It would have been prima facie obvious to one of ordinary skill in the art at the time of the invention to incorporate the method of Canavello into that of Choi because (a) the reflective mirror elements of Canavello would have provided a desirable improvement in efficiency to the Choi process, or (b) one would have found it desirable to adjust or regulate the application of light to the photoresist in Choi, and use of reflective elements would have been a conventional means for accomplishing this result. **As to Claims 15 and 18** Canavello suggests positive or negative resists (Abstract), and the material is either removed or preserved depending on the type of resist (3:27-34). **As to Claim 17**, in view of Canavello's suggestion to use reflected light for exposure, it is submitted that one of ordinary skill in the art would have found it obvious to use reflective elements to reflect light within the photoresist in other directions, and to thereby create slanted walls. **As to Claims 20 and 21**, in the Choi process, a polymer structure is formed having the physical feature in the form of a multi-tooth feature (Fig. 2D), which would inherently be usable as a waveguide.

5. **Claim 17** is rejected under 35 U.S.C. 103(a) as being unpatentable over Choi (US 2002/0094496) in view of Canavello (US 4,379,833), and further in view of Otsuka (US 5,643,700). **As to Claim 17**, Choi and Canavello do not expressly teach the slanted polymer material. However, Canavello does teach reflective materials on the substrate. Additionally, Otsuka teaches oblique application of radiation to a photoresist surface (2) and reflection off a substrate (1a). In view of Canavello's suggestion to use the substrate as a reflective element, and Otsuka's teaching that this (a reflective surface) may be further combined with oblique application of light, it is submitted that one would have found it obvious to reflect radiation in

oblique directions. It would have been *prima facie* obvious to one of ordinary skill in the art at the time of the invention to incorporate the method of Otsuka into the modified method of Choi because the oblique application of radiation into a photoresist is conventional for use with reflective substrates, as disclosed by Otsuka, and the combination would have merely provided the expected result of a slanted configuration in the photoresist similar to that achieved with grayscale masks.

6. **Claims 16, 17, and 19** are rejected under 35 U.S.C. 103(a) as being unpatentable over Choi (US 2002/0094496) in view of Canavello (US 4,379,833), and further in view of Gal (US 5,480,764). Choi and Canavello teach the subject matter of Claim 14 above under 35 USC 103(a). **As to Claims 16, 17, and 19**, Canavello suggests positive or negative resists (Abstract), but Choi and Canavello are silent to the formation of a slanted polymer wall or a tunnel. However, Gal teaches that it is known to form slanted polymer layer walls by exposing and developing photoresist to form an angle designed for use in a tunnel (Figs. 15-27). Subsequent use of this reflective element in forming tunnels would have been obvious in view of Gal's teaching in Fig. 22, which demonstrates It would have been *prima facie* obvious to one of ordinary skill in the art at the time of the invention to incorporate the method of Gal into the modified process of Choi because Choi teaches a process for exposing photoresist, and Gal teaches that photoresist and reflective elements can be used to form tunnels useful as waveguides. Thus, Choi suggests a technique for fabricating photoresist, and Gal teaches a technique in which a particular article is formed from photoresist.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to MATTHEW J. DANIELS whose telephone number is (571)272-2450. The examiner can normally be reached on Monday - Friday, 8:00 am - 4:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Christina Johnson can be reached on (571) 272-1176. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Matthew J. Daniels/
Primary Examiner, Art Unit 1791
10/26/08